

**Transmittal Letter to the United States
Designated/Elected Office (DO/EO/US)**

Prepared from
FORM PTO-1390

Attorney's Docket No. : M38-024
U.S. Application No. : Not Yet Assigned 10/009712
U.S. Application Filed : Herewith
International Application No. : PCT/IB00/00778
International Filing Date. : 10 June 2000 (10.06.00)
Priority Date Claimed : 10 June 1999 (10.06.99)
Title of Invention : REINFORCED FLEXIBLE HOSE AND METHOD FOR
THE PRODUCTION THEREOF
Applicant for (DO/EO/US) : MEZZALIRA, Rinaldo

**Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US)
the following items and other information:**

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This express request to begin national examination procedures [35 U.S.C. 371 (f)] at any time rather than delay examination until the expiration of the applicable time limit set forth in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed [35 U.S.C. 371(c)(2)]
 - a) ☒ is transmitted herewith (required only if not transmitted by the International Bureau);
 - b) ☐ has been transmitted by the International Bureau;
 - c) ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ A translation of the International Application into English [35 U.S.C. 371(c)(2)].
7. ☐ Amendments to the claims of the International Application under PCT Article 19 [35 U.S.C. 371(c)(3)]
 - a) ☐ are transmitted herewith (required only if not transmitted by the International Bureau);
 - b) ☐ have been transmitted by the International Bureau;
 - c) ☐ have not been made; however, the time limit for making such amendments has **NOT** expired;
 - d) ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 [35 U.S.C. 371(c)(3)].
9. ☒ An oath or declaration of the inventor(s) [35 U.S.C. 371(c)(4)].
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 [35 U.S.C. 371(c)(5)].

Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98.
12. ☒ An Assignment document for recording. (A separate Cover Sheet in compliance with 37 CFR 3.28 and 3.31 is included.)
13. ☒ A **FIRST** preliminary amendment.
14. ☒ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☒ A substitute specification.
16. ☒ A change of power of attorney and/or address letter.
17. ☒ (other items or information) Published International Application Publication No. WO 00/77433 A1; International Search Report; Abstract; International Preliminary Examination Report; Verified Statement Claiming Small Entity Status.

EXPRESS MAIL No.: EL 890535175 US

Deposited: December 7, 2001

I hereby certify that this correspondence is being deposited with the United States Postal Service Express Mail under 37 CFR 1.10 on the date indicated above and is addressed to the U.S. Patent and Trademark Office, P.O. Box 2327, Arlington, VA 22202.

Curtis L. Schrandt

December 7, 2001

Date

Attorney's Docket No: RNS M38-024

07 DEC 2001

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- NOTE:** Where an appropriate time limit under 36 CFR 1.494 or 1.495 has not been met, a petition to revive [37 CFR 1.137(a) or (b)] must be filed and granted to restore the application to pending status.

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December 7, 2001
Date

IN THE UNITED STATES RECEIVING OFFICE (DO/EO/US)

APPLICANT(S) : MEZZALIRA, Rinaldo
U.S. APPL'N SERIAL NO. : Not yet assigned
U.S. APPL'N FILED : Herewith
INT'L APPL'N NO. : PCT/IB00/00778
INT'L FILING DATE : 10 June 1999 (10.06.99)
FOR : REINFORCED FLEXIBLE HOSE AND METHOD FOR
THE PRODUCTION THEREOF

Commissioner for Patents
Box PCT
Washington, D.C. 20231

PRELIMINARY AMENDMENT

S I R:

Prior to calculation of the filing fee in the above-identified application, please amend the application as follows:

IN THE CLAIMS:

Amend claim 1 as follows:

1. (Once Amended) Multiple layer reinforced flexible hose comprising at least one first inner tubular layer made of extruded plastic material, at least one second outer tubular layer made of extruded plastic material, a tubular reinforcement made of a textile material interposed between said first and said second layer, said layers being homogeneously joined in correspondence of their mutual contact surface so as to define a wall having an overall predetermined thickness, an end portion of said wall having an increased thickness along longitudinal

portions of predetermined extensions to thereby provide watertight sealing action with external connection organs, wherein said increased thickness is substantially constant along the whole extension of said longitudinal portions and the thickness increase is non-linear towards the free end of said longitudinal portions.

Amend claim 2 as follows:

2. (Once Amended) Reinforced flexible hose according to claim 1, wherein said increased thickness is only localized on said outer tubular layer.

Amend claim 3 as follows:

3. (Once Amended) Reinforced flexible hose according to claim 1, wherein said increased thickness is only localized on said inner tubular layer.

Amend claim 4 as follows:

4. (Once Amended) Reinforced flexible hose according to claim 1, wherein said increased thickness is localized on both said outer tubular layer and said inner tubular layer.

Amend claim 5 as follows:

5. (Once Amended) Reinforced flexible hose according to claim 1, wherein said first and said second tubular layers are colored with different pigmentation along their whole extension or along parts thereof.

Amend claim 6 as follows:

6. (Once Amended) Reinforced flexible hose according to claim 5, wherein said pigmentation and colorings are substantially

uniform and they are differentiated in correspondence of the thickness change of said longitudinal portions with predetermined extension.

Amend claim 7 as follows:

7. (Once Amended) Reinforced flexible hose according to claim 1, wherein said hose comprises one or more further inner, outer or middle tubular layers, made of plastic material, having technical and/or aesthetic functions.

Amend claim 8 as follows:

8. (Once Amended) Reinforced flexible hose according to claim 7, wherein said one or more further plastic material layers are chosen from the group comprising food compatible, anti-abrasives, UV shielding and ornamental films.

Amend claim 9 as follows:

9. (Once Amended) Method for the production of a flexible hose, comprising the following steps:

a) extruding at least one first inner tubular layer made of plastic material having a substantially constant advancement speed;

b) weaving a tubular reinforcement made of textile fabrics material onto an outer surface of said first inner tubular layer, at the same advancement speed;

c) extruding at least one second outer tubular layer made of plastic material at substantially the same advancement speed of said first inner tubular layer and said tubular reinforcement so as to allow a homogeneous fitting of said layers and form a wall having a predetermined thickness;

d) providing longitudinal portions having an increased thickness in at least one of said first and second tubular layers so as to enhance resistance of the hose in order to favor a stable mating to hose end joints or to other irrigation

accessories; and

e) cutting the hose in correspondence to said longitudinal portions having increased thickness, wherein said increased thickness is made substantially constant along the whole extension of said longitudinal portions and with non-linear increase toward the free end of said longitudinal portions.

Amend claim 10 as follows:

10. (Once Amended) Method according to claim 9, wherein said step d) is accomplished by means of a change in the advancement speed for at least one of said tubular layers in correspondence to said portions having increased thickness, said speed change being carried out instantaneously and being subsequently reduced to zero along said longitudinal portions.

Amend claim 11 as follows:

11. (Once Amended) Method according to claim 9, wherein said step d) is accomplished by means of a change in the flow of extruded material in correspondence to the increase in thickness, said flow change being instantaneous.

Amend claim 12 as follows:

12. (Once Amended) Method according to claim 9, wherein said step d) is accomplished by thickening only said first inner tubular layer.

Amend claim 13 as follows:

13. (Once Amended) Method according to claim 9, wherein said step d) is accomplished by thickening only said second outer tubular layer.

Amend claim 14 as follows:

14. (Once Amended) Method according to claim 9, wherein said

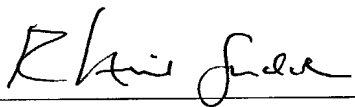
step d) is accomplished by thickening both said inner (2) and said outer tubular layers.

REMARKS

The present amendment is submitted to eliminate multiple dependent claims, particularly improper multiple dependent claims, eliminate reference designations, and to reduce the filing fee.

Respectfully submitted,

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APPENDIX TO PRELIMINARY AMENDMENT
AMENDED CLAIMS IN U.S. NATIONAL PHASE OF PCT/IB00/00778

1. (Once Amended) Multiple layer reinforced flexible hose comprising at least one first inner tubular layer [(2)] made of extruded plastic material, at least one second outer tubular layer [(3)] made of extruded plastic material, a tubular reinforcement [(4)] made of a textile material interposed between said first [(2)] and said second [(3)] layer, said layers [(2, 3)] being homogeneously joined in correspondence of their mutual contact surface so as to define a wall having an overall predetermined thickness [(S)], an end portion of said wall having an increased thickness along longitudinal portions [(A, B)] of predetermined extensions to thereby provide watertight sealing action with external connection organs, [characterised in that] wherein said increased thickness is substantially constant along the whole extension [(A)] of said longitudinal portions and in that the thickness increase is non-linear towards the free end of said longitudinal portions.

2. (Once Amended) Reinforced flexible hose according to claim 1, [characterised in that] wherein said increased thickness [(S')] is only [localised] localized on said outer tubular layer [(3)].

3. (Once Amended) Reinforced flexible hose according to claim 1, [characterised in that] wherein said increased thickness [(S')] is only [localised] localized on said inner tubular layer [(2)].

4. (Once Amended) Reinforced flexible hose according to claim 1, [characterised in that] wherein said increased thickness [(S')] is [localised] localized on both said outer tubular layer [(3)] and said inner tubular layer [(2)].

5. (Once Amended) Reinforced flexible hose according to claim 1, [characterised in that] wherein said first [(2)] and said second tubular layers [(3)] are [coloured] colored with different pigmentation along their whole extension or along parts thereof.

6. (Once Amended) Reinforced flexible hose according to claim 5, [characterised in that] wherein said pigmentation and [colourings] colorings are substantially uniform and they are differentiated in correspondence of the thickness change of said longitudinal portions [(A, B)] with predetermined extension.

7. (Once Amended) Reinforced flexible hose according to [anyone of the preceding claims] claim 1, [characterised in that] wherein [it] said hose comprises one or more further inner, outer or middle tubular layers, made of plastic material, having technical and/or aesthetic functions.

8. (Once Amended) Reinforced flexible hose according to claim 7, [characterised in that] wherein said one or more further plastic material layers are chosen [in] from the group comprising food compatible, anti-abrasives, UV shielding and ornamental films.

9. (Once Amended) Method for the production of a flexible hose [according to anyone of claims 1 to 8], comprising the following steps:

a) extruding at least one first inner tubular layer [(2)] made of plastic material having a substantially constant advancement speed (V);

b) weaving a tubular reinforcement made of textile fabrics material [(4)] onto [the] an outer surface of said first inner tubular layer [(3)], at the same advancement speed [(V)];

c) extruding at least one second outer tubular layer [(2)] made of plastic material at substantially the same advancement speed [(V)] of said first inner tubular layer [(2)] and said tubular reinforcement [(4)] so as to allow a homogeneous fitting of said layers [(2, 3)] and form a wall having a predetermined thickness [(S)];

d) providing longitudinal portions [(A, B)] having an increased thickness [(S', S'')] in at least one of said first and[/or] second tubular layers [(2, 3)] so as to enhance resistance of the hose in order to [favour] favor a stable mating to hose end joints or to other irrigation accessories; and

e) cutting the hose in correspondence [of] to said longitudinal portions [(A, B)] having increased thickness, [characterised in that] wherein said increased thickness is made substantially constant along the whole extension [(A)] of said longitudinal portions and with non-linear increase toward[s] the free end of said longitudinal portions.

10. (Once Amended) Method according to claim 9, [characterised in that] wherein said step d) is accomplished by means of a change [(ΔV)] in the advancement speed [(V)] for at least one of said tubular layers [(2, 3)] in correspondence [of] to said [layers] portions [(A, B)] having increased thickness, said speed change [(ΔV)] being carried out instantaneously and being subsequently reduced to zero along said longitudinal portions [(A)].

11. (Once Amended) Method according to claim 9, [characterised in that] wherein said step d) is accomplished by means of a change $[(\Delta Q)]$ in the flow $[(Q)]$ of extruded material in correspondence of the increase in thickness, said flow change $[(\Delta Q)]$ being instantaneous.

12. (Once Amended) Method according to [anyone of claims 9 to 11] claim 9, [characterised in that] wherein said [phase] step d) is accomplished by thickening only said first inner tubular layer [(3)].

13. (Once Amended) Method according to [anyone of claims 9 to 12] claim 9, [characterised in that] wherein said [phase] step d) is accomplished by thickening only said second outer tubular layer [(2)].

14. (Once Amended) Method according to [anyone of claims 9 to 12] claim 9, [characterised in that] wherein said [phase] step d) is accomplished by thickening both said inner [(3)] and said outer [(2)] tubular layers.

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SUBSTITUTE SPECIFICATION

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"REINFORCED FLEXIBLE HOSE AND METHOD FOR THE PRODUCTION THEREOF"

FIELD OF THE INVENTION

5

The present invention relates to a reinforced flexible hose, particularly but not exclusively suitable for the field of gardening.

BACKGROUND OF THE INVENTION

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Flexible hoses are known which belong to the cheap category of the market. In order to control production costs, these are produced joining two coaxial tubular layers having reduced thickness, by means of the insertion of a knitted or woven reinforcement therebetween.

15

The above mentioned types of hoses are usually employed in connection with mounts, joints or irrigation tools having standard size and manufactured on a mass scale. Tubes having a reduced thickness are hard to join to the standard quick-fit joints, therefore a short while after the hose starts being used, water
20 leaks are often found to occur through the joining area.

A further disadvantage of said known hoses is that they are prone to be easily twisted and damaged where they connect with the joint, most often in proximity of the water mains tap.

25

Several attempts to overcome the above shortcomings were made in the past, for instance fixing joints that are pressed and made to be suitable for the hose either at the production stage or resorting to hose joints to be fixed between the hose and the standard joint, said hose joints being made of a similar material to
30 that the tube is made of and further being suitably secured.

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Although on the one hand the above solutions lead to a reinforcement of the hose wall, thus making its bending more difficult, on the other hand they bring about an increase in production costs, that makes them not too favourably welcomed by the users of this specific market.

5

A further disadvantage is that in case the hose breaks and is subject to shortening at its end portions, it turns out to be mandatory to use standard joints that have the known sealing problems deriving from the difficulty there is to find special joints distributed by the normal large-scale retail trade.

10

In case reinforcements are made by hose joints, it is likewise difficult to find spare hose joints to replace those that cannot be recovered after a damaged hose has been shortened.

- 15 EP-A-0 118 613 discloses a flexible hose for shower and sanitary fixtures having all the features mentioned in the preamble of the attached claim 1. However, the thickness of one of the inner and outer layers is increased gradually and in a linear way and is not constant along the whole extension of longitudinal end portions. Thus, the end portion with increased thickness must have a relatively long extension in
20 order to provide a sufficient resistance for the joints.

SUMMARY OF THE INVENTION

- 25 A primary object of the present invention is to provide a new type of hose that is capable of being easily and effectively joined to the standard joints, in so doing maintaining its enhanced sealing properties and avoiding water leaks, while retaining its cost effectiveness at the production stage and remaining comprised in the low-cost category on the market.

- 30 A further specific object of the present invention is to design a hose of the type

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outlined above that features a structure that is capable of minimising the risks of breakage, twisting or detachment at the joining with the tap or with the watering tool.

- 5 The above objects are accomplished by providing a reinforced flexible hose that comprises in accordance with the attached claim 1 is characterised in that the increased thickness is substantially constant along the whole extension of the longitudinal portions and in that the thickness increase is non-linear towards the free end of said longitudinal portions.
- 10 Thanks to said reinforcements, it is thus possible to use joints of the standard type, maintaining a mechanical connection at the reinforced end of the hose, preventing the hose to detach from the joint and reducing the danger of twisting the end portion thereof during handling by the user.
- 15 A further object of the present invention is to provide a simple method for the production of a hose according to the present invention, that allows the production of great quantities thereof on a continuous basis at low costs, by using the existing equipment, though suitably modified for that purpose.
- 20 The above object is accomplished by providing a method for the production of a reinforced flexible hose that in accordance with the attached claim 9 comprises the following steps:
- 25 a) extruding at least one first inner tubular layer (2) made of plastic material having a substantially constant advancement speed (V);
- b) weaving a textile fabrics material (4) onto the outer surface of said first layer (3), at the same advancement speed (V);
- 30 c) extruding at least one second tubular layer (2) made of plastic material at substantially the same advancement speed (V) of said first layer (2) and said tubular reinforcement (4) so as to allow a homogeneous fitting of said layers (2, 3) and form a wall having a predetermined thickness

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(S);

d) providing longitudinal portions (A, B) having an increased thickness (S', S'') in said first and/or second tubular layer (2,3) so as to enhance resistance of the hose in order to favour a stable mating to hose end joints or to other irrigation accessories;

e) cutting the hose in correspondence of said longitudinal portions (A,B) having increased thickness,

characterised in that said increased thickness is made substantially constant along the whole extension (A) of said longitudinal portions and with non-linear increase towards the free end of said longitudinal portions.

Step d) can be accomplished by varying the advancement speed of at least one of the said layers in correspondence at said longitudinal portions thereof having greater thickness. The speed change can be accomplished instantaneously, then the speed is kept at a constant value for a portion of its length.

As an alternative, step d) can also be accomplished by varying the flow of the extruded material having increased thickness.

The finished hose alternatively features end-longitudinal portions having increased thickness and being frusto-conically shaped as with their larger side in common, or it may otherwise feature a cylindrically shaped thicker portion.

At the end of the process, the hose is cut in correspondence of the section having maximum diameter or of the middle area of the portion having increased thickness.

BRIEF DESCRIPTION OF THE DRAWINGS

Further features and advantages of the present invention will be more clearly apparent in the light of the following description of a preferred but not exclusive

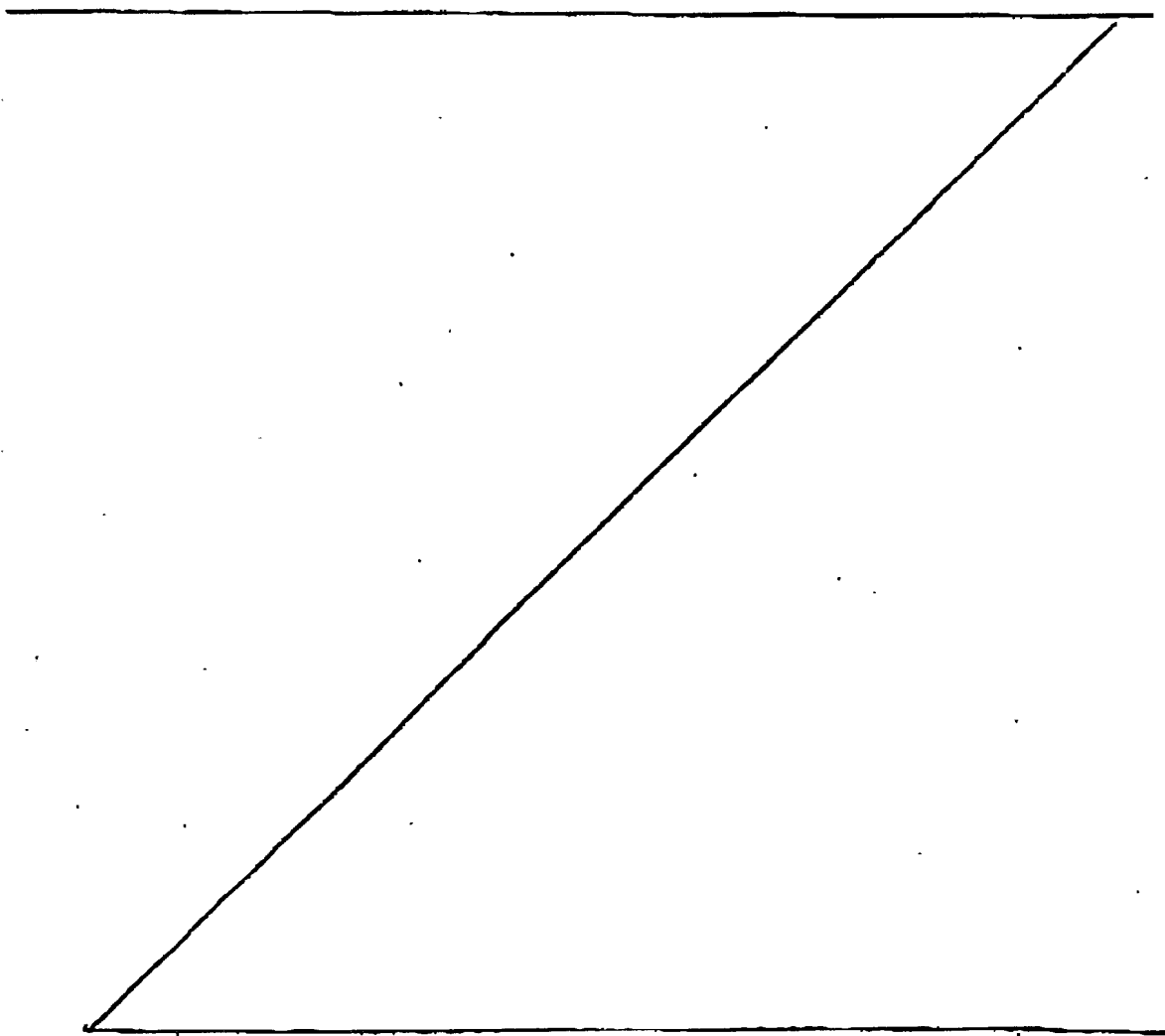
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embodiment, given by way of not limiting example, of a reinforced flexible hose illustrated in the attached drawings, wherein:

fig. 1 shows a longitudinal section view of the hose of the prior art,

fig. 2 is a cross-sectional view of the hose shown in Fig. 1;

5 fig. 3 is a general perspective view of an embodiment of the reinforced flexible hose according to the present invention;



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fig. 4 is a longitudinal sectional view of a first embodiment of the present invention;

fig. 5 is a general perspective view of a second embodiment of the reinforced flexible hose according to the present invention;

fig. 6 is a cross sectional view of the embodiment of flexible hose shown in Fig. 5;

fig. 7 is a cross sectional view of the hose shown in Fig. 6;

fig. 8 is a schematic side view of a device for the production of a hose according to the present invention, with said device in a first operating position;

fig. 9 is a schematic side view of the device shown in Fig. 8, with said device in a second operating phase.

DESCRIPTION OF SOME PREFERRED FORMS OF EMBODIMENT

15

With reference to Figs. 1 and 2 a flexible hose of the prior art is shown, generally indicated with the reference numeral 1, that is essentially formed by two tubular coaxial layers, respectively an inner layer having an inner diameter D_i and an outer layer having an outer diameter D_e , and with a tubular reinforcement or stock 4 made of fibrous material, of the woven or knitted type, that is interposed between the two layers 2, 3 and extends over the entire length thereof.

20

Layers 2, 3 are made of extruded plastic materials and are mutually joined in correspondence of their mutual contact surface with the interposition of reinforcement 4 so as to form a wall having an overall thickness S that is substantially constant, except the working tolerances connected with the extrusion of layers with the weaving of the reinforcement fabrics 4.

25

30 Figs. 3 and 4 show a first embodiment of hose 1 according to the present

invention, said hose having a thickness S' along a portion A of its length starting at one end 5, said thickness being increased with respect to thickness S of the portion of hose 1 that is the furthest from its end 5.

- 5 In this first embodiment, tube wall 1 has either a substantially constant thickness along the whole portion A past circular step 6 or an extremely short conical connecting portion. Thus it will be possible to promote a stable watertight mating with connecting organs or gardening hose joints, thereby avoiding water leakages and any sort of breakages at those hose joints.

10

According to a second embodiment of the reinforced flexible hose of the present invention, illustrated by Figs. 4, 5 and 6, the increase in thickness of the hose wall is accomplished by a gradual increase in thickness of the outer layer 3 starting from point 6 where the wall has a thickness that is equal to the average
15 normal thickness S. Therefore thickness increases in a linear fashion until it reaches a maximum value S'' in correspondence of end 5. This is accomplished by means of an increase in thickness limited to the outer layer 3.

In general, longitudinal portions A and B having increased thickness allow the
20 accomplishment of a stable mechanical grip with standard joints or irrigation tools and accessories of the threaded ferrule type, that has an enhanced mechanical and hydraulic resistance where the hose has a greater thickness.

In view of the fact that the greatest stresses caused by the user's handling are
25 localised where the joints are coupled to the hose, the reinforcement according to the present invention brings about a reduction in the ease with which the hose bends and twists, with a further advantage for the user.

Layers 2, 3 that form the hose can be made of the same or of different
30 materials, in accordance with the technical and aesthetic requirements to be

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met. The inner tubular layer can for instance be made of a material that is suitable for allowing contact with food or beverage products without releasing dangerous or harmful particles, whereas the outer layer can be made of a less noble material that is very unsuitable for alimentary use.

5

It is also possible to envisage further outer layers or films made of materials with anti-abrasive properties, or likewise being shielding against ultraviolet (UV) radiation, that have purely ornamental and aesthetic, with various different uniform or patterned colourings and pigmentations.

10

According to the present invention, reinforcement 4 can also be laid over exclusively one extruded tubular layer rather than being interposed between two co-extruded layers, if and whenever appropriate.

15

Furthermore it is possible to form the increased thickness exclusively on the inner tubular layer 2, as well as it is possible to provide the increased thickness of both layers in correspondence of the same area.

20

In Figs. 8 and 9 a machine for the production of a plastic hose extrusion according to the present invention is schematically depicted, that is part of a full production line for the flexible hose.

25

In Fig. 8 an intermediate product is shown and indicated with the reference numeral ~~2~~^{1'} said product consisting of the inner tubular layer 2, whereon the woven or knitted tubular reinforcement fabric 4 is formed.

30

The semi-finished product 1' is guided by rollers 7, 8, 9 up to an extrusion head 10 that forms the outer tubular layer 3 coaxially to the product 1'. For a first embodiment, the flow Q of the material extruded from head ~~2~~¹⁰ is constant and the thickness of the extruded tubular layer 3 deposited around product 1'

depends on its advancement speed V within head 10. Advancement speed V of finished tube 1 is generally constant at the very end of the production process, therefore a decrease ΔV in the speed is accomplished combining the actuation of roller groups 7, 8 and 9 and 11, 12, 13 accompanying the hose. In particular, moving downwards the roller 8 located upstream of the extrusion head 10 and moving upwards the roller 12 located downstream of the extrusion head 10, until positioning them as shown in Fig. 8, the length of the path the tube must move along is varied, thereby reducing its velocity from V to $V - \Delta V$ in correspondence with head 10.

10

A change in speed ΔV can then be accomplished either gradually or instantaneously, depending on the configuration the portion with increased thickness must have. Applying a suitable algorithm to the change in advancement speed, end portions with an increased thickness can be shaped differently.

15

In a second embodiment of the production method according to the present invention, it is possible to accomplish an increase in thickness by a variation ΔQ of extruded material flow Q , deposited by the extrusion head 10.

20

Downstream of the extrusion head 10 there may also be provided a container 14 wherein the finished hose 1 that is still warm can be subjected to further working process, or be simply allowed to cool down.

The production of the hose is carried out on a continuous basis and the length of the end portions where the increased thickness of the hose wall are formed is defined as a function of the overall length of the hose to be produced. When the production of a first batch is over, the segments of hose are severed at the middle point of their thickened portion. In order to identify the point where the tube is to be cut, the pigmentation and colouring of the outer layer of the

30

finished hose may be varied. Such pigmentation and colour may be varied along the end portions in order to produce hoses having longitudinal portions with a different colour, so as to easily highlight the area where variations in thickness occur. To this end, it is likewise possible to carry out the injection of pigmented material having different colours through head 10.

The overall colouring of the hose, that is of its outer layer, and possibly as well as of the woven reinforcement fabrics can be accomplished with materials that are either uniformly coloured or that are striped, using the same or different colours. Colour combinations are also possible in so doing obtaining a wide range of aesthetic, optical and visual effects.

AMENDED CLAIMS

- 25

5 6. Reinforced flexible hose according to claim 5, characterised in that said pigmentation and colourings are substantially uniform and they are differentiated in correspondence of the thickness change of said longitudinal portions (A, B) with predetermined extension.

10 7. Reinforced flexible hose according to anyone of the preceding claims, characterised in that it comprises one or more further inner, outer or middle tubular layers, made of plastic material, having technical and/or aesthetic functions.

15 8. Reinforced flexible hose according to claim 7, characterised in that said one or more further plastic material layers are chosen in the group comprising food compatible, anti abrasives, UV shielding and ornamental films.

20 9. Method for the production of a flexible hose according to anyone of claims 1 to 8, comprising the following steps:

a) extruding at least one first inner tubular layer (2) made of plastic material having a substantially constant advancement speed (V);

25 b) weaving a textile fabrics material (4) onto the outer surface of said first layer (3), at the same advancement speed (V);

c) extruding at least one second tubular layer (2) made of plastic material at substantially the same advancement speed (V) of said first layer (2) and said tubular reinforcement (4) so as to allow a homogeneous fitting of said layers (2, 3) and form a wall having a predetermined thickness (S);

30 d) providing longitudinal portions (A, B) having an increased thickness (S', S'') in said first and/or second tubular layer (2,3) so as to enhance resistance of the hose in order to favour a stable mating to hose end joints or to other irrigation accessories;

e) cutting the hose in correspondence of said longitudinal portions (A,B) having increased thickness,

characterised in that said increased thickness is made substantially constant along the whole extension (A) of said longitudinal portions and with non-linear increase towards the free end of said longitudinal portions.

10. Method according to claim 9, characterised in that said step d) is accomplished by means of a change (ΔV) in the advancement speed (V) for at least one of said layers (2, 3) in correspondence of said layers (A, B) having increased thickness, said speed change (ΔV) being carried out instantaneously and being subsequently reduced to zero along said longitudinal portions (A).

11. Method according to claim 9, characterised in that said step d) is accomplished by means of a change (ΔQ) in the flow (Q) of extruded material in correspondence of the increase in thickness, said flow change (ΔQ) being instantaneous.

12. Method according to anyone of claims 9 to 11, characterised in that said phase d) is accomplished by thickening only said first inner layer (3).

13. Method according to anyone of claims 9 to 12, characterised in that said phase d) is accomplished by thickening only said second outer layer (2).

14. Method according to anyone of claims 9 to 12, characterised in that said phase d) is accomplished by thickening both said inner (3) and said outer (2) layers.

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531 Rec'd PCT/10/009712 07 DEC 2001

Abstract

A reinforced flexible hose comprising as least a first inner extruded tubular layer and at least a second extruded tubular layer with a tubular reinforcement fabric provided between said first and second hoses. The two tubes are joined so as to form a homogeneous unit by their mutual contact surfaces, by gluing or molecular adhesion, for example. The end portion of the hose increases in width so much as to make it possible to achieve a better mechanical hold with the standard junctions to which it is bound to be fixed. The thickness increases at the end portions may either be constant along its whole length, or start gradually toward the end.

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Although on the one hand the above solutions lead to a reinforcement of the hose wall, thus making its bending more difficult, on the other hand they bring about an increase in production costs, that makes them not too favourably welcomed by the users of this specific market.

5

A further disadvantage is that in case the hose breaks and is subject to shortening at its end portions, it turns out to be mandatory to use standard joints that have the known sealing problems deriving from the difficulty there is to find special joints distributed by the normal large-scale retail trade.

10

In case reinforcements are made by hose joints, it is likewise difficult to find spare hose joints to replace those that cannot be recovered after a damaged hose has been shortened.

15

SUMMARY OF THE INVENTION

A primary object of the present invention is to provide a new type of hose that is capable of being easily and effectively joined to the standard joints, in so doing maintaining its enhanced sealing properties and avoiding water leaks, while retaining its cost effectiveness at the production stage and remaining comprised in the low-cost category on the market.

A further specific object of the present invention is to design a hose of the type outlined above that features a structure that is capable of minimising the risks of breakage, twisting or detachment at the joining with the tap or with the watering tool.

The above objects are accomplished by providing a reinforced flexible hose that comprises at least one first extruded tubular layer provided internally of at least one second tubular extruded layer, a tubular reinforcement of a textile fabrics

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material provided between said first and said second layers, said layers being joined in correspondence of their mutual contact surfaces, wherein an end portion of the hose has an increased thickness along a predetermined length.

- 5 Thanks to said reinforcements, it is thus possible to use joints of the standard type, maintaining a mechanical connection at the reinforced end of the hose, preventing the hose to detach from the joint and reducing the danger of twisting the end portion thereof during handling by the user.
- 10 A further object of the present invention is to provide a simple method for the production of a hose according to the present invention, that allows the production of great quantities thereof on a continuous basis at low costs, by using the existing equipment, though suitably modified for that purpose.
- 15 The above object is accomplished by providing a method for the production of a reinforced flexible hose according to the present invention, characterised in that it comprises the following steps:
- a) extrusion of at least one first tubular layer of plastic material having a predetermined thickness and a predetermined advancement speed;
 - 20 b) weaving a tubular reinforcement on the outer surface of said first layer, with said predetermined advancement speed,
 - c) extrusion of at least one second tubular layer made of plastic material all around said first layer as well as of said tubular reinforcement, so as to allow a homogeneous joining therebetween, at substantially the same advancement speed;
 - 25 d) formation on said first and/or on said second tubular layers of longitudinal portions having increased thickness so as to enhance the intrinsic resistance of the hose in order to enhance stable attachment thereof to end joints and/or other irrigation
 - 30

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accessories;

e) cutting the hose in the over of increased thickness.

Step d) can be accomplished by varying the advancement speed of at least one
5 of the said layers in correspondence at said longitudinal portions thereof having
greater thickness. The speed change can be accomplished either in a gradual
fashion so as to increase the hose thickness along a portions of its length, or
instantaneously, then the speed is kept at a constant value for a portion of its
length.

10

As an alternative, step d) can also be accomplished by varying the flow of the
extruded material having increased thickness.

The finished hose alternatively features end-longitudinal portions having
15 increased thickness and being frusto-conically shaped as with their larger side in
common, or it may otherwise feature a cylindrically shaped thicker portion.

At the end of the process, the hose is cut in correspondence of the section
having maximum diameter or of the middle area of the portion having increased
20 thickness.

BRIEF DESCRIPTION OF THE DRAWINGS

Further features and advantages of the present invention will be more clearly
25 apparent in the light of the following description of a preferred but not exclusive
embodiment, given by way of not limiting example, of a reinforced flexible hose
illustrated in the attached drawings, wherein:

fig. 1 shows a longitudinal section view of the hose of the prior art,

fig. 2 is a cross-sectional view of the hose shown in Fig. 1.

30 fig. 3 is a general perspective view of an embodiment of the reinforced

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flexible hose according to the present invention;

fig. 4 is a longitudinal sectional view of a first embodiment of the present invention;

fig. 5 is a general perspective view of a second embodiment of the reinforced flexible hose according to the present invention;

fig. 6 is a cross sectional view of the embodiment of flexible hose shown in Fig. 5;

fig. 7 is a cross sectional view of the hose shown in Fig. 6;

fig. 8 is a schematic side view of a device for the production of a hose according to the present invention, with said device in a first operating position;

fig. 9 is a schematic side view of the device shown in Fig. 8, with said device in a second operating phase.

DESCRIPTION OF SOME PREFERRED FORMS OF EMBODIMENT

15

With reference to Figs. 1 and 2 a flexible hose of the prior art is shown, generally indicated with the reference numeral 1, that is essentially formed by two tubular coaxial layers, respectively an inner layer having an inner diameter D_i and an outer layer having an outer diameter D_o , and with a tubular reinforcement or stock 4 made of fibrous material, of the woven or knitted type, that is interposed between the two layers 2, 3 and extends over the entire length thereof.

20

Layers 2, 3 are made of extruded plastic materials and are mutually joined in correspondence of their mutual contact surface with the interposition of reinforcement 4 so as to form a wall having an overall thickness S that is substantially constant, except the working tolerances connected with the extrusion of layers with the weaving of the reinforcement fabrics 4.

25

Figs. 3 and 4 show a first embodiment of hose 1 according to the present

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invention, said hose having a thickness S' along a portion A of its length starting at one end 5, said thickness being increased with respect to thickness S of the portion of hose 1 that is the furthest from its end 5.

5 In this first embodiment, tube wall 1 has either a substantially constant thickness along the whole portion A past circular step 6 or an extremely short conical connecting portion. Thus it will be possible to promote a stable watertight mating with connecting organs or gardening hose joints, thereby avoiding water leakages and any sort of breakages at those hose joints.

10

According to a second embodiment of the reinforced flexible hose of the present invention, illustrated by Figs. 4, 5 and 6, the increase in thickness of the hose wall is accomplished by a gradual increase in thickness of the outer layer 3 starting from point 6 where the wall has a thickness that is equal to the average
15 normal thickness S. Therefore thickness increases in a linear fashion until it reaches a maximum value S'' in correspondence of end 5. This is accomplished by means of an increase in thickness limited to the outer layer 3.

In general, longitudinal portions A and B having increased thickness allow the
20 accomplishment of a stable mechanical grip with standard joints or irrigation tools and accessories of the threaded ferrule type, that has an enhanced mechanical and hydraulic resistance where the hose has a greater thickness.

In view of the fact that the greatest stresses caused by the user's handling are
25 localised where the joints are coupled to the hose, the reinforcement according to the present invention brings about a reduction in the ease with which the hose bends and twists, with a further advantage for the user.

Layers 2, 3 that form the hose can be made of the same or of different
30 materials, in accordance with the technical and aesthetic requirements to be

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met. The inner tubular layer can for instance be made of a material that is suitable for allowing contact with food or beverage products without releasing dangerous or harmful particles, whereas the outer layer can be made of a less noble material that is very unsuitable for alimentary use.

5

It is also possible to envisage further outer layers or films made of materials with anti-abrasive properties, or likewise being shielding against ultraviolet (UV) radiation, that have purely ornamental and aesthetic, with various different uniform or patterned colourings and pigmentations.

10

According to the present invention, reinforcement 4 can also be laid over exclusively one extruded tubular layer rather than being interposed between two co-extruded layers, if and whenever appropriate.

15 Furthermore it is possible to form the increased thickness exclusively on the inner tubular layer 2, as well as it is possible to provide the increased thickness of both layers in correspondence of the same area.

In Figs. 8 and 9 a machine for the production of a plastic hose extrusion
20 according to the present invention is schematically depicted, that is part of a full production line for the flexible hose.

In Fig. 8 an intermediate product is shown and indicated with the reference numeral 1, said product consisting of the inner tubular layer 2, whereon the
25 woven or knitted tubular reinforcement fabric 4 is formed.

The semi-finished product 1' is guided by rollers 7, 8, 9 up to an extrusion head 10 that forms the outer tubular layer 3 coaxially to the product 1'. For a first embodiment, the flow Q of the material extruded from head 9 is constant and
30 the thickness of the extruded tubular layer 3 deposited around product 1'

depends on its advancement speed V within head 10. Advancement speed V of finished tube 1 is generally constant at the very end of the production process, therefore a decrease ΔV in the speed is accomplished combining the actuation of roller groups 7, 8 and 9 and 11, 12, 13 accompanying the hose. In particular, moving downwards the roller 8 located upstream of the extrusion head 10 and moving upwards the roller 12 located downstream of the extrusion head 10, until positioning them as shown in Fig. 8, the length of the path the tube must move along is varied, thereby reducing its velocity from V to $V - \Delta V$ in correspondence with head 10.

10

A change in speed ΔV can then be accomplished either gradually or instantaneously, depending on the configuration the portion with increased thickness must have. Applying a suitable algorithm to the change in advancement speed, end portions with an increased thickness can be shaped differently.

15

In a second embodiment of the production method according to the present invention, it is possible to accomplish an increase in thickness by a variation ΔQ of extruded material flow Q , deposited by the extrusion head 10.

20

Downstream of the extrusion head 10 there may also be provided a container 14 wherein the finished hose 1 that is still warm can be subjected to further working process, or be simply allowed to cool down.

25 The production of the hose is carried out on a continuous basis and the length of the end portions where the increased thickness of the hose wall are formed is defined as a function of the overall length of the hose to be produced. When the production of a first batch is over, the segments of hose are severed at the middle point of their thickened portion. In order to identify the point where the tube is to be cut, the pigmentation and colouring of the outer layer of the

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finished hose may be varied. Such pigmentation and colour may be varied along the end portions in order to produce hoses having longitudinal portions with a different colour, so as to easily highlight the area where variations in thickness occur. To this end, it is likewise possible to carry out the injection of pigmented material having different colours through head 10.

The overall colouring of the hose, that is of its outer layer, and possibly as well as of the woven reinforcement fabrics can be accomplished with materials that are either uniformly coloured or that are striped, using the same or different colours. Colour combinations are also possible in so doing obtaining a wide range of aesthetic, optical and visual effects.

CLAIMS

1. Multiple layer reinforced flexible hose comprising at least one first inner tubular layer (2) made of extruded plastic material, at least one second
5 outer tubular layer (3) made of extruded plastic material, a tubular reinforcement (4) made of a textile material interposed between said first (2) and said second (3) layer, said layers (2, 3) being homogeneously joined in correspondence of their mutual contact surface so as to define a wall having an overall predetermined thickness
10 (S), wherein an end portion of said wall has an increased thickness along longitudinal portions (A, B) having predetermined extensions to thereby provide watertight sealing action with external connection organs.
- 15 2. Reinforced flexible hose according to claim 1, characterised in that said increased thickness (S') is only localised on said outer tubular layer (3).
3. Reinforced flexible hose according to claim 1, characterised in that said increased thickness (S') is only localised on said inner tubular layer (2).
20
4. Reinforced flexible hose according to claim 1, characterised in that said increased thickness (S') is localised on both said outer tubular layer (3) and said inner tubular layer (2).
- 25 5. Reinforced flexible hose according to claim 1, characterised in that said increased thickness is substantially constant along the whole extension (A) of said longitudinal portions.
6. Reinforced flexible hose according to claim 1, characterised in that said
30 increased thickness increases gradually towards the free end of said

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longitudinal portions (B).

7. Reinforced flexible hose according to claim 1, characterised in that said increased thickness increases non-linearly towards the free end of said longitudinal portions.
8. Reinforced flexible hose according to anyone of the preceding claims characterised in that said first (2) and said second layers (3) are coloured with different pigmentations along their whole extension or along parts thereof.
9. Reinforced flexible hose according to claim 8, characterised in that said pigmentations and colourings are substantially uniform and they are differentiated in correspondence of the thickness change of said longitudinal portions (A, B) with predetermined extension.
10. Reinforced flexible hose according to anyone of the preceding claims, characterised in that it comprises one or more further inner, outer or middle tubular layers, made of plastic material, having technical and/or aesthetic functions.
11. Reinforced flexible hose according to claim 10, characterised in that said one or more further plastic material layers are chosen in the group comprising food compatible, anti abrasives, UV shielding and ornamental films.
12. Method for the production of the flexible hose according to anyone of claims 1 to 11, characterised in that it comprises the following steps:
 - a) extrusion of at least a first inner tubular layer (2) made of plastic

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- material having a substantially constant advancement speed (V);
- b) weaving textile fabrics material (4) onto the outer surface of said first layer (3), at the same advancement speed;
- 5 c) extrusion of at least a second tubular layer (2) made of plastic material at substantially the same advancement speed, on said first layer (2) and said tubular reinforcement (4) so as to allow a homogeneous fitting of said layers (2, 3) so as to form a wall having a predetermined thickness (S);
- 10 d) production of longitudinal portions (A, B) having an increased thickness (S', S'') in said first and/or second tubular layer (2,3) so as to enhance resistance of the hose in order to favour a stable mating to hose end joints or to other irrigation accessories;
- 15 e) cutting the hose in correspondence of said longitudinal portions (A,B) having increased thickness.
13. Method according to claim 12, characterised in that said step d) is accomplished by means of a change (ΔV) in the advancement speed (V) for at least one of said layers (2, 3) in correspondence with said layers (A, B) having increased thickness.
- 20 14. Method according to claim 13, characterised in that the change (ΔV) in advancement speed is accomplished in a gradual fashion so that the thickness of said wall linearly increases along said longitudinal portions (B) having a length reaching a maximum predetermined value (S'').
- 25 15. Method according to claim 13, characterised in that the change (ΔV) in advancement speed is carried out instantaneously and it is subsequently reduced to zero along longitudinal portions (A) having a predetermined
- 30

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length such that they increase the thickness (S) in said longitudinal portions of the hose (1) up to a maximum predetermined value (S').

5 16. Method according to claim 12, characterised in that said phase d) is accomplished by a change (ΔQ) in the flow (Q) of extruded material in correspondence of the increase in thickness.

10 17. Method according to anyone of claims 12 to 16, characterised in that said phase d) is accomplished by thickening only said first inner layer (3).

15 18. Method according to anyone of claims 12 to 16, characterised in that said phase d) is accomplished by thickening only said second outer layer (2).

19. Method according to anyone of claims 12 to 16, characterised in that said phase d) is accomplished by thickening both said inner (3) and said outer (2) layers.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
21 December 2000 (21.12.2000)

PCT

(10) International Publication Number
WO 00/77433 A1

(51) International Patent Classification: **F16L 11/12, 35/00**

(21) International Application Number: **PCT/IB00/00778**

(22) International Filing Date: **10 June 2000 (10.06.2000)**

(25) Filing Language: **English**

(26) Publication Language: **English**

(30) Priority Data:
VI99A000120 10 June 1999 (10.06.1999) IT

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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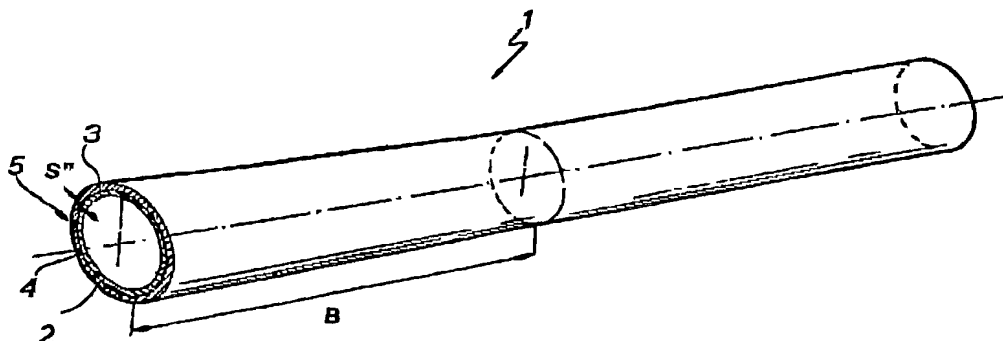
Published:
— *With international search report.*

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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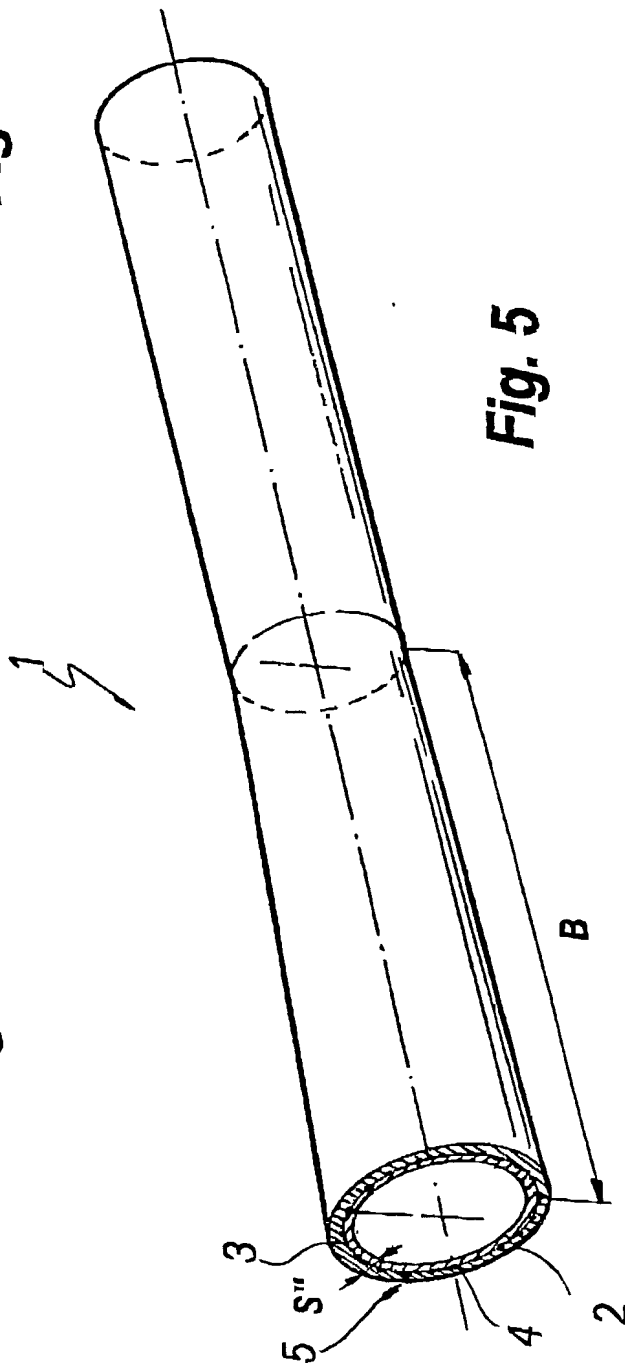
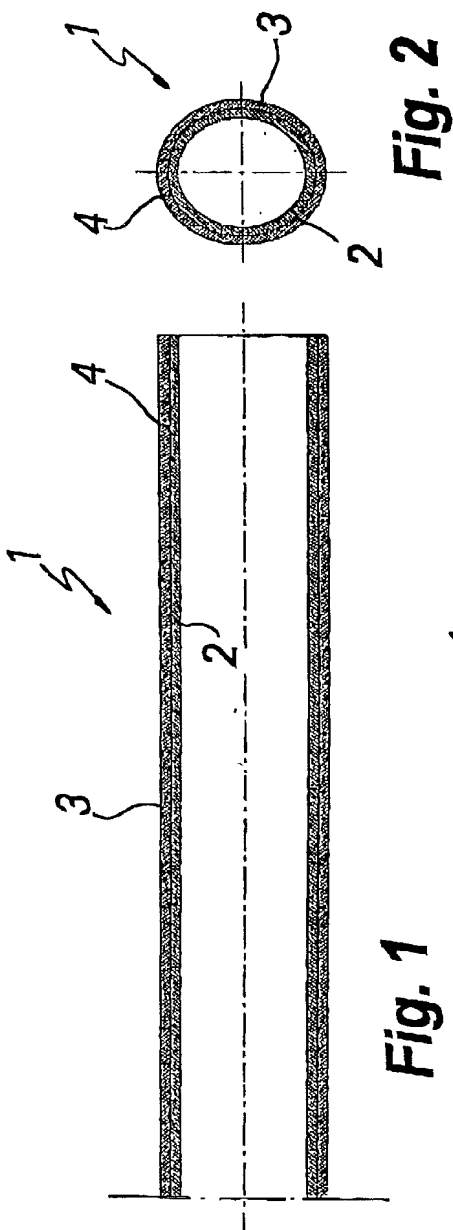
(54) Title: **REINFORCED FLEXIBLE HOSE AND METHOD FOR THE PRODUCTION THEREOF**



(57) Abstract: A reinforced flexible hose (1) comprising at least a first inner extruded tubular layer (3) and at least a second extruded tubular layer (2) with a tubular reinforcement fabric (4) provided between said first (3) and second (2) hoses. The two tubes are joined so as to form a homogeneous unit by their mutual contact surfaces, by gluing or molecular adhesion for example. The end portion of the hose (1) increases in width so much as to make it possible to achieve a better mechanical hold with the standard junctions to which it is bound to be fixed. The thickness increases at the end portions may either be constant along its whole length, or start gradually toward the end.

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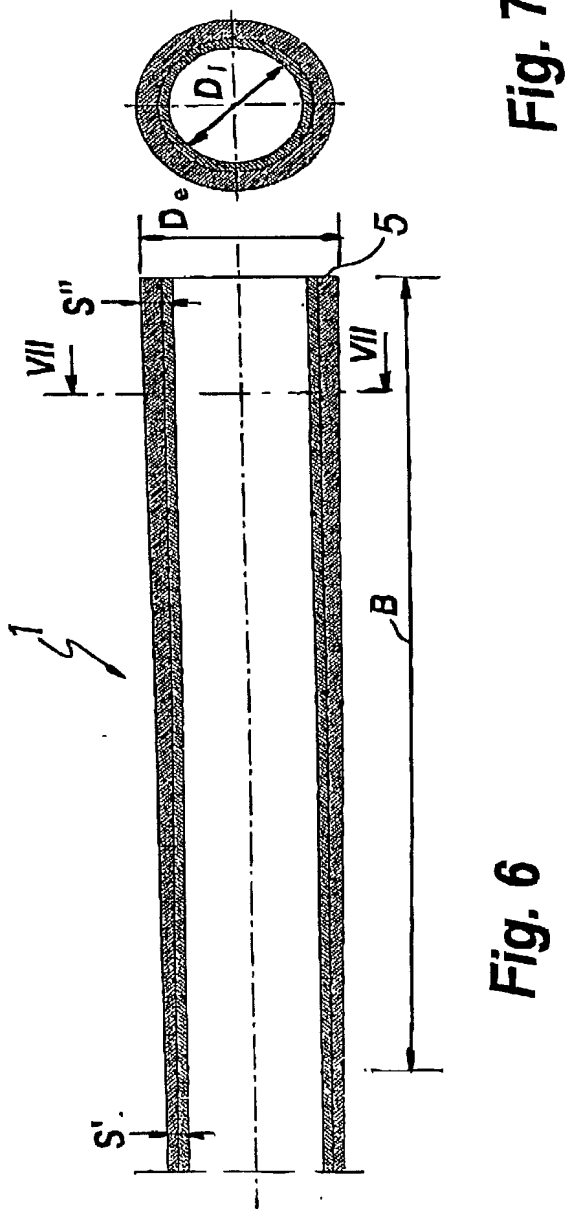
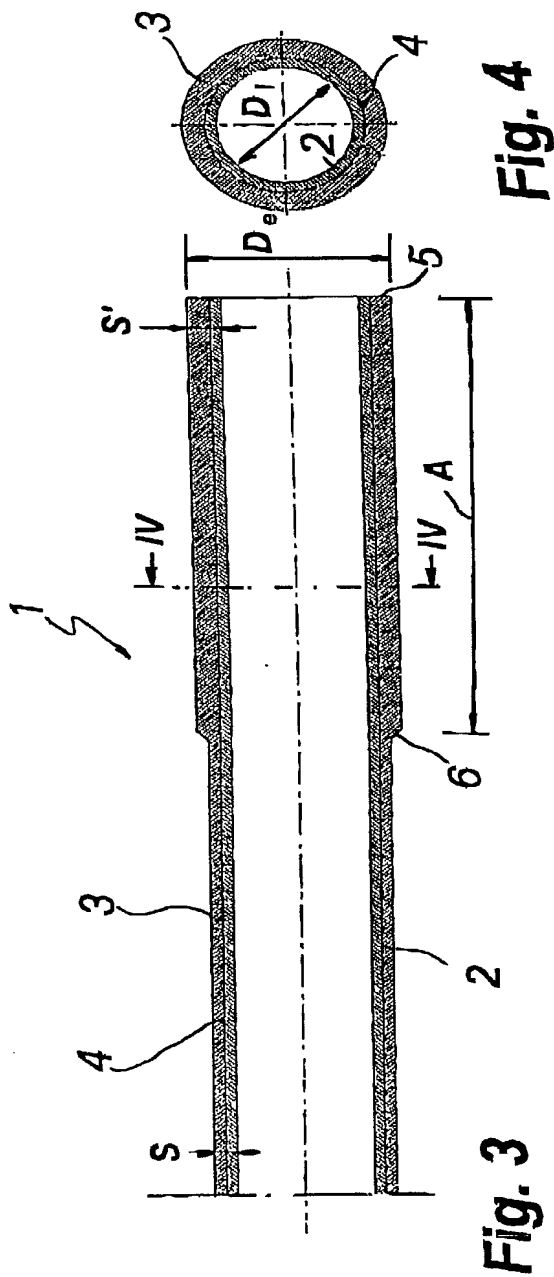


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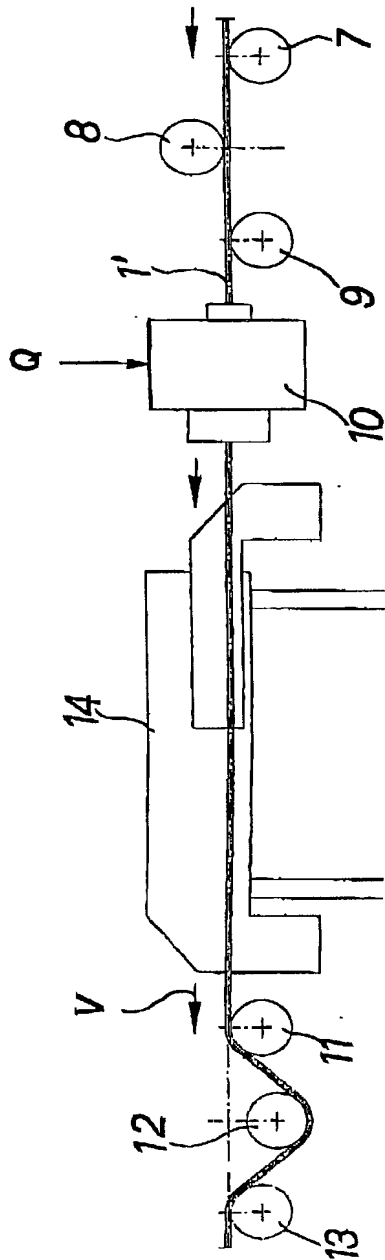


Fig. 8

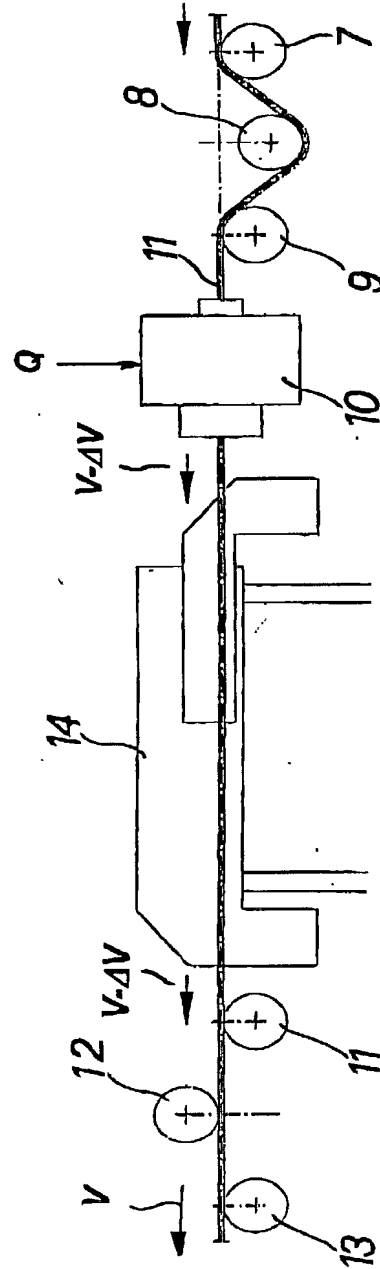


Fig. 9

REINFORCED FLEXIBLE HOSE AND METHOD FOR THE PRODUCTION THEREOF

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I (we) hereby declare that:

My residence, post office address and citizenship are the same as stated below next to my name.

I (we) believe I am (we are) an original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

REINFORCED FLEXIBLE HOSE AND METHOD FOR THE PRODUCTION THEREOF

the specification of which (check one)

☒ Is attached hereto.

☐ Was filed on _____ as Application Serial No. _____

and was amended on _____ (if applicable).

☐ was filed as PCT International application No. _____ on _____

and was amended on _____ (if applicable).

I (we) hereby state that I (we) have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I (we) acknowledge the duty to disclose information known to me to be material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I (we) hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Number	Country	Filing Date (mm/dd/yyyy)	Priority Claimed
VI99A000120	ITALY	10/06/1999	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
PCT/IB00/00778	PCT	10/06/2000	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

I (we) hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below:

Number	Filing Date (mm/dd/yyyy)
_____	_____

I (we) hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulation, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

Application Serial No.	Filing Date (d/m/y)	Status (Patented, Pending, Abandoned)
------------------------	---------------------	---------------------------------------

I (we) hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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I (we) hereby declare that all statements made herein of my (our) own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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- 7 DIC, 2001

Date _____

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Residence:

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Country of Citizenship:

Date _____

Inventor's Signature

Full name of third inventor:

Residence:

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Country of Citizenship:

Date _____

Inventor's Signature

Applicant/Patentee: EUROCONDOTTE SPA
 Serial/PatentNo.: Not Yet Assigned
 Filed/Issued: Herewith
 For: REINFORCED FLEXIBLE HOSE AND METHOD FOR THE PRODUCTION THEREOF
 Attorney's Docket No.: M38-024

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
 (37 CFR 1.9(f) and 1.27(c)) - SMALL BUSINESS CONCERN**

I hereby declare that I am

- ☐ the owner of the small business concern identified below:
☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN EUROCONDOTTE SPA
 ADDRESS OF CONCERN Corso Palladio, 42
36100 VICENZA - ITALY

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled:

REINFORCED FLEXIBLE HOSE AND METHOD FOR THE PRODUCTION THEREOF
 by inventor(s) MEZZALIRA, Rinaldo
 described in

- ☒ the specification filed herewith.
☐ application serial no. _____, filed _____
☐ patent no. _____, issued _____

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27).

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Verified Statement (Declaration) Claiming Small Entity Status
(37 CFR 1.9(f) and 1.27(c)) - Small Business Concern

Page 2

Applicant/Patentee : EUROCONDOTTE S.R.L.
Serial/Patent No. : Not Yet Assigned
Filed/Issued : Herewith
For : REINFORCED FLEXIBLE HOSE AND METHOD FOR THE
PRODUCTION THEREOF
Attorney's Docket No. : M38-024

NAME OF CONCERN _____

ADDRESS OF CONCERN _____

()INDIVIDUAL ()SMALL BUSINESS CONCERN ()NONPROFIT ORGANIZATION

I acknowledge the duty to file in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patents issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING MEZZALIRA, Rinaldo
TITLE OF PERSON OTHER THAN OWNER President
ADDRESS OF PERSON SIGNING Via Breganzola, 3 - 36057 ARCUGNANO
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SIGNATURE _____
DATE - 7 DEC. 2001 _____

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